QUAIL ISLAND: FORESHORE RESOURCE ASSESSMENT

BY

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Department of Lands & Survey,
Christchurch.

1. INTRODUCTION

First through the Landscape section, and more recently the Parks and Recreation section, of the Department of Horticulture, Landscape and Parks, Lincoln College has been involved with the resource evaluation of Quail Island as a reserve. The island after a varied history as a ballast supplier, ships' graveyard, leper colony, quarantine station and farm was declared a recreation reserve in August 1975. Under the Reserves Act 1977 a management plan which protects the island's scenic, historic, archaeological, biological, geological and soil and water values, as well as improving its value for recreation, must be prepared. A number of agencies including the groups mentioned above have been invited to provide information to help in the preparation of the management plan. The Department of Lands and Survey which administers the island and which commissioned this foreshore survey is aware that the marine life around the island and in particular in the inter-tidal zone influences the use and enjoyment of the island. The department hopes that the reserve may be extended to Low Water Springs and it is the area between High Water Springs and Low Water Springs on which the present survey has been centred.

2. TERMS OF REFERENCE

We were requested by the Department of Lands and Survey (Ref. 8/3/322/4) to provide advice on the following matters:

1. A description (type of (sic) extent) of marine life around the island.
2. The ability of such values to support recreation, education or scientific activities.

3. The sensitivity of identified marine life to land activities based on Quail Island.
4. The sensitivity of identified marine life to water based activities based around Quail Island.
5. Any management recommendations that we considered necessary or desirable to encourage the conservation of marine life which support recreation, education or scientific activities.

With terms of reference as wide as these and the amount of published information (see later) it was pointed out to the department (letter dated 30 October 1978) that not all of the points could be adequately covered by one survey visit. A longer term monitoring of the intertidal fauna (and flora) would be necessary to give definitive answers to some questions. Therefore with these reservations the survey, which would provide the necessary base data, was undertaken.

3. METHODS

Eleven beach transects were examined during a 4 day visit (6-9 November, 1978); their location around the island is shown in Figure 1. As can be seen from the figure the transect sites were selected so that they were representative of the substrate types and degree of wave exposure that are found round the island. Each transect stretched from above mean high water mark (MHW) to below mean low water mark (MLW). At selected points along the transect line an area was examined and all species present recorded. Except for transects J and K this area started as approximately a $30cm^2$ and was progressively enlarged until either no new species were discovered or else an area of $1m^2$ had been examined. The selected points were at varying

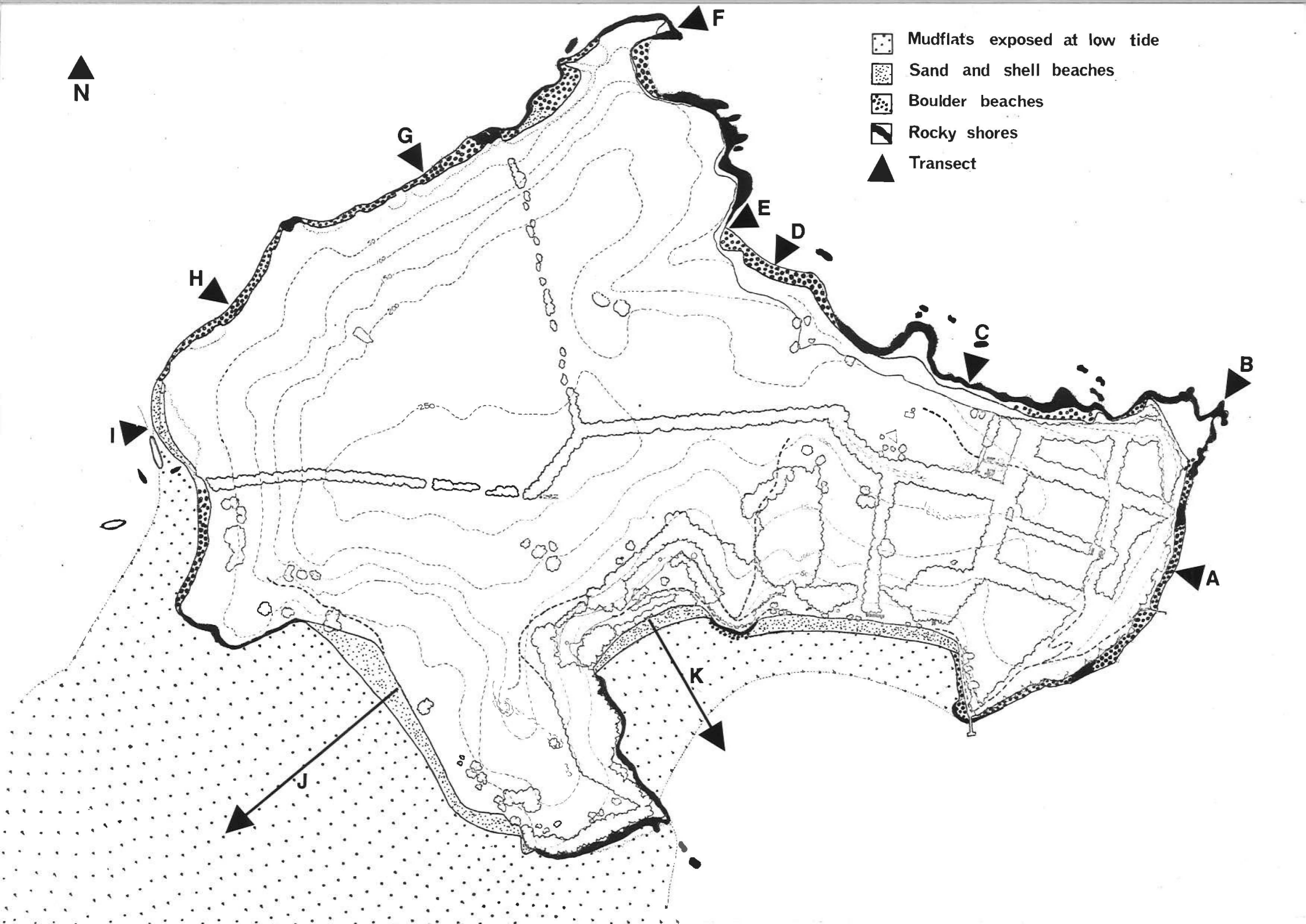
distances apart depending on the slope and substrate of the particular shore; 5m apart in most transects but 10 or even 20m apart on the mudflats (transects J and K, Fig. 1). Where no positive identification could be made in the field a representative specimen was collected and preserved for later identification. In the case of the transects J and K after the surface of the substrate had been examined one spade square, one spit deep, was removed and washed in standard sieves and the species so collected noted or retained and preserved as above.

In addition to this regular sampling other species seen, but not recorded from a transect, were recorded separately and appear in Appendix A. It was not possible, because of a boat breakdown, to get on to the boulder beach to the south of the point where transect F was carried out (the only access to this bay is by boat) and as this beach is the one most open to the winds and north east swell coming up Lytteoton Harbour it might harbour species not found elsewhere. This point must be checked in some future survey.

4. RESULTS

The species list and the distribution of these species between the various transects is given in Appendix A. No species of direct conservation value because of distributions restricted to Quail Island or its environs were encountered. Nevertheless because of the number of species that could only be identified to genus concerned) it is possible that species of restricted distribution, and hence of conservation value, are present. In addition species

FIGURE 1: Quail Island showing the approximate positions of the transect lines examined 6-9 November, 1978. (Scale 1:6000)


N
F
G
E
D
H
C
B
I
A
K
J
Mudflats exposed at low tide
Sand and shell beaches
Boulder beaches
Rocky shores
Transect

are not always present in significant numbers even though they were recorded as present from a number of transects. For example the oyster was recorded from transect B but is present in this area in very low numbers while it is quite numerous in the area near transect G. This oyster is also of interest because, according to Morton (pers. comm.), some definitive work is required to sort out the New Zealand species of oysters. For the moment this oyster has been referred to as the Dunedin oyster Ostrea heffordi but really the only certainty is that it is not the northern rock oyster, Crassostrea glomerata.

One uniform feature from transect A round to transect G was the presence of quantities of silt and mud which reached a peak at transect G. This mud and silt was present as a coating on the algae and rocks at most stations except transect F which seemed to receive more wave action than the other transects. The coating did not seem to have caused significant deaths of any individuals in transects A - E but it could interfere with the settling out of larvae or clog the feeding mechanisms of filter feeders. In the region of transect G the effects of this mud and silt were much more obvious. The coating was 3-5cm deep and had become strongly anaerobic. When boulders at LWM were rolled over the black anaerobic condition gave off a very strong smell and the various animal species on the underside of the boulders were all recently dead. We were informed by people on the island and by local residents that this mud and silt was caused by the operations of the dredge in the harbour keeping the navigation channel cleared to the required depth. If these observations of ours on the recently dead animals and the silt layer are regular events then it could

suggest that recruitment at least on the northern half of the island is quite active. Nevertheless it would require careful monitoring and research to find out how long the fauna could stand repeated siltations without suffering permanent effects or modification.

A feature noticed while carrying out transects J and K was the presence of many young flounder (Rhombosolea spp.) in the 5.0 - 7.5cm size range. The mudflats on the southern shores of the island certainly seemed to be well populated with these young fish. However again, as with the silting, more research will be needed before answers to questions such as the significance of the the Quail Island mudflats as juvenile feeding grounds; the significance of the Quail Island juvenile population to, say, the Lyttelton Harbour flounder population; the actual breeding grounds and of course the possible effects of such activities as water skiing on these juveniles can be given.

Another feature of the island's fauna about which we must comment, though it is not directly part of the inter-tidal zone, was the presence of nesting birds. On the promontory above transect F there was a colony of breeding Black-backed gulls (Larus dominicus) to which there was easy access on foot. Also on various parts of the shoreline kingfisher nesting holes are present and there is also evidence of some penguin nesting holes in one or two areas, though no penguins were actually seen. The other nesting sites on the cliffs above transects C, D and E are fairly inaccessible and should therefore be reasonably safe except to the most determined of individuals intent on visiting them.

6. DISCUSSION

The previous section covers the first item in our terms of reference. We shall now turn to the other items. To begin with we must point out and re-emphasise the point made in Section 2 that it is difficult to give definitive answers to some of the questions because they require an on-going monitoring programme. This difficulty is increased because, as was pointed out at a symposium on the seashore at the recent ANZAAS Conference, we know very little about the seashore (Ballantine, 1979). This is especially so in things like population dynamics (which includes recruitment rates) and the effects of man's activities on these natural phenomena. The other major point made in the paper quoted above and definitely the most important one is that few people know or appreciate how little we know. So with these strictures and qualifications we shall now discuss as well as possible the inter-tidal fauna of Quail Island under the headings in the terms of reference.

For the purposes of this discussion we have assumed recreation to include sailing, fishing, water skiing and swimming in the waters around the island and picnicking and general walking (tramping) on and around the island. Water based recreational activities, with the exception perhaps of the water skiing do not seem likely to impinge greatly on the inter-tidal fauna and the water round the island would appear to be too murky to be attractive to skin divers so the sub littoral fauna is also unlikely to be affected. The reference to water-skiing is mainly with regard to the presence of young flounder as already mentioned in Section 5 and relates particularly to the provision of the ski lane in one bay. This

restriction to one bay for the faster boat speeds near the shore necessary for water skiing may be sufficient protection for the overall flounder population because of the reasonably large extent of unaffected shores. As far as shore-based recreational activities are concerned walking around the foreshore or over the island could interfere with the nesting birds referred to in Section 6 unless some steps were taken to minimise this. Such steps might include affording protection by fencing of the gull colony with the provision of a viewing platform etc so that the need for many people to enter the colony would be reduced. Naturally a fence is not visually very attractive nor is it likely to exclude any individuals who are determined to enter the colony but the provision of viewing facilities with appropriate notes and descriptions available should keep disruption to a minimum. The other likely effect of recreational walking is the disturbance of the various members of the beneath-boulder fauna where at and near the LWS level boulders are lifted and not returned to their original position so exposing the fauna to unnecessary bird predation and/or dessication.

Increased recreational use could also lead to increased use of the various shellfish as food. All species, especially in some areas (e.g. oysters near transects A and B), could withstand little such pressure because their numbers are so small. There is also the question of food quality because of the silt and other material entering the harbour. Therefore while it might tacitly be expected that people would not harvest shellfish from the island for food, a wise precaution might be to spell out clearly that such harvesting was forbidden (for both the reasons mentioned) on the noticeboards which already detail other legal provisions.

The island because of its different shore types, aspect and degrees of exposure offers significant educational value. The distribution and zonation of various species on the different shores make the Quail Island foreshore a very interesting one for senior school classes. Some upgrading of facilities in the old barracks to cater for school groups of 20-30 could lead to the better utilisation of the island foreshore as an educational resource. Obviously it would be imperative to emphasise conservational aspects, e.g. removal of as few specimens as are vital to the school's study programme, the replacement of boulders and turned over rocks etc. This behaviour also provides another educational value. It is probably not necessary to go into great detail at this stage about the sorts of studies that senior school biology parties might undertake but it seems reasonable to suggest that a handbook be prepared of the type that is currently near completion for the Lincoln College Field Station at Oaro (Jowett, 1979). Most of the information necessary for the foreshore section of such a booklet is contained within the material of this report but if such a booklet is prepared it would seem sensible to include other educational activities that could be based on the island. Reference to such activities perhaps turns the emphasis from senior school biology parties to groups from lower levels of both primary and secondary schools. Again the foreshore would seem to provide an area for good educational experiences that might fit in with visits more concerned with the Social Studies aspects of the school curriculum. These activities would likely centre round the previous habitations and the leper graves but might also include the former ballast removal and the sunken ships. Because this centre of focus is on the opposite side of the island to what is probably the most useful 'general' seashore near transect B it would only be possible

to combine historical or social study visits with biological if more than one day were spent on the island. This again would seem to require upgrading of the facilities even if it were only to improve the stove and to provide some good tent-pitching sites near the old barracks (which could serve as a dining room/classroom). The conservational aspects already mentioned with regard to the senior classes would probably be even more important at this level especially if any significant continuous programme of school visits occurred.

As far as scientific activities are concerned a number of possible research topics have already been highlighted. With perhaps the exception of those concerned with the flounder the majority do not require highly sophisticated techniques or equipment, e.g. monitoring species composition of various representative shores (perhaps on permanent transects); monitoring the effects of silting; monitoring the recruitment rates etc. Such research projects are therefore not beyond the capabilities of senior school pupils who represent an often untapped source of labour, enthusiasm and in many cases considerable expertise.

As far as the sensitivity of the foreshore fauna to land based activities on the island are concerned our primary concern is with the bird nesting sites and in particular the gull colony. Gulls will put up with some disturbance through people walking close to the colony or through it but obviously if such interference is great during breeding (October - December), then nests may be deserted with the resultant death of embryos or nestlings. We feel that it would be a sad loss to the total biology of the island, especially for its educational use, if the colony did not survive and flourish. As far as other components of the fauna are concerned we feel that the encouragement and fostering of reasonable attitudes and behaviour

by school groups, which would seem likely to be the major pressures on the fauna, should be sufficient to protect the fauna. Again, though, the lack of data and consequent need for continuous monitoring cannot be over-emphasised.

With regard to water based activities around the island affecting the foreshore it would appear that at present the greatest influence on the fauna is the activity of the harbour dredge. This influence can even extend to the death of significant numbers of animals as we saw during the survey visit but it may be beyond the department's control to do anything to alleviate these effects. The other major water based activities, besides perhaps the always present possibility of overfishing probably do not affect the foreshore life with the possible exception of the effect of motor boats and water skiers on the juvenile flounder. Not enough is known about the larval stages of most of the species on the seashore to know if water based activities have any effect on the larval development or subsequent settling out of larvae.

8. RECOMMENDATIONS

We recommend that:

1. Consideration be given to affording the gull colony some protection in the form of fencing and the provision of a viewing platform.
2. All groups using the island should be made aware of basic conservation principles of taking as few specimens as are vitally necessary to the work of the groups, of replacing rocks and boulders that have been overturned, or re-burying animals from the substrate etc.

3. On-going research programmes should be commenced to monitor the fauna.
4. The accommodation facilities be improved to allow greater use of the educational opportunities provided by the island.

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APPENDIX A

	SPECIES LIST	TRANSECT DISTRIBUTION [1]
Phylum PORIFERA	Ancorina alata	C
	Cliona celata	A,B,C,F
	Tedania sp.	G
	Tethya aurantium	A,B,C,G
Phylum COELENTERATA		
Class ANTHOZOA	Actinothoe albocincta	D,H
	Anthopleura aureoradiata	G,H,I,J,K
	Culicia rubeola	F
	Isactinia olivacea	A,D
Plylum PLATYHELMINTHES		
Class TURBELLARIA	Leptoplana sp.	J
	Stylochoplana sp.	E,F
	Thysanozoon brochii	B,G,J
Phylum NEMERTEA	Amphiporus sp.	A
	Dendrostomum sp.	A,F,G
Phylum ANNELIDA		
Class POLYCHAETA	Branchioma sp.	A
	Eteone sp.	C
	Eulalia microphylla	A,F,G,I,K
	Eunicidae (indet.)	J
	Flabelligera affinis	C,F
	Galeolaria hystrix	F
	Lepidonotus polychroma	A,C,F,H
	Nereis sp.	C
	Nicon aestuariensis	I,K
	Perenereis sp. A	F
	Perenereis sp. B	I
	Perenereis novaehollandiae	C,H,K
	Perenereis nuntia	A,H,
	Phyllodoce sp.	B
	Pisione sp.	C
	Platynereis australis	H
	Pomatocerus caeruleus	A,B,C,E,F,G,H,I,J,K
	Spirorbis australis	B,C,D,F
	Terebella haplochaeta	C
	Terebellides sp.	C
	Tomopteris sp.	J

[1] Species listed with an asterisk were found adjacent to but not actually within the transect quadrats.

Phylum MOLLUSCA		
Class AMPHINEURA	Acanthochiton zelandicus	A,B,C,F,G,H,J
	Amaurochiton glaucus	A,B,C,F,G,H,I,J
	Anthochiton aereus	E,F
	Cryptoconchus porosus	B,G
	Ischnochiton sp. A	F
	Ischnochiton sp. B	G
	Ischnochiton maorianus	A,B,C,F,G,H
	Sypharochiton pelliserpentis	A,B,C,F,G,H,I,J
	Sypharochiton sinclarii	B,C,F,G,J
Class GASTROPODA	Atalacmea fragilis	C
	Buccinulum lineum	A,B,C,G
	Buccinulum multilineum	A
	Cantharidus sp.	D
	Cellana denticulata	A
	Cellana ornata	A,D,E,F
	Cellana ornata conspicuous	J
	Cellana radians	A,E,F
	Cellana radians earli	C
	Cominella sp.	J
	Cominella glandiformis	J,K
	Cominella maculosa	A,B,C,F,G,H,I,J,K
	Haustrum haustorium	A,B,C,F,G
	Lepsiella scobina	A,B,C,F,G,I
	Littorina unifasciata (formerly Melarapha oliveri)	A*,B*,F
	Lunella smaragda	A,B,C,F,H,J
	Melagraphia aethiops	A,B,C,D,F,G,H,I,J
	Micrelenchus huttoni	C,K
	Notoacmea sp.	C
	Notoacmea daedala	B,C,F,G,H,I,J,K
	Notoacmea helmsi	A,G,J
	Notoacmea parviconoidea	B,C,J
	Patelloidea corticata corallina	I,J
	Risellopsis varia	B,C,E,F,J
	Rissoinia chathamensis	B,G
	Scutus breviculus	A
	Sigapatella novaezelandiae	A,B,C,E
	Taron dubius	B,C,F,G,K
	Trochus viridis	C
	Tugali elegans	F
	Xymene plebejus	J,K
	Zeacumantus lutulentus	F
	Zeacumantus subcarinatus	C,F,G
	Zediloma atrovirens	J
	Zediloma corrosa	H
	Zediloma subrostrata	K

Sub-Class PULMONATA	Marinula filholi	F
	Onchidella nigricans	A,B,C,G
	Siphonaria cookiana	C,F,H,J
	Siphonaria zelandica	G,J
Class BIVALVIA	Amphidesma australe	F,G,I,K
	Aulacomya maoriana	A,C,F,G,I
	Chione stutchburyi	A,C,F,G,I,J,K
	Chlamys zelandiae	B
	Macomona liliana	K
	Mytilus edulis aoteanus	B,E,F,H,I,J
	Notirus reflexus	F
	Ostrea heffordi	A,B,G,H,I,K
	Perna canaliculus	B,C,E,F,G,H,I
	Xenostrobus pulex (formerly Modiolus neozelanicus)	J
Phylum ARTHROPODA Class INSECTA	Coelopidae (various indet.)	D,E
	Opifex fuscus	F,G
	Staphylinidae (indet.)	I
	Therevidae (indet.)	K
Class CRUSTACEA Sub-Class CIRRIPEDIA	Chamaesipho columna	A,B,C,F,G,H,I,J
	Eliminus modestus	A,B,C,D,F,G,H,J
	Epopella plicata (formerly Eliminus plicatus)	B,C,F
Sub-class MALACOSTRACA Order AMPHIPODA	Gammaridae (indet.) sp. A	B,C,I
	Gammaridae (indet.) sp. B	C
	Jassidae (indet.)	C
	Paracorophium excavatum	K
	Pontogeniidae (indet.)	C
	Talorchestia sp.	D,E,H,
	Talorchestia quoyana	B,C,F,G,H,I,K
Order ISOPODA	Cirolana arcuata	B,I,K
	Isocladus armatus	B,C,D,E,H,K,
	Ligia novaezelandiae	B,C,F,G
Order DECAPODA	Cyclograpsus lavauxi	A,B,C,D,E,F,G,H,I
	Halicarcinus whitei	F
	Helice crassa	J
	Hemigrapsus crenulatus	D,J,K
	Hemigrapsus edwardsi	D,F,I
	Macrophthalmus hirtipes	I,K
	Ovalipes punctatus	K
	Petrolisthes elongatus	A,B,C,D,F,G,H,I,J,k

Class ARACHNIDA	Amaurobioides maritima	C,I
	Thrombidiidae (indet.)	G
Class PYCNOGONIDA	1 individual (indet.)	B
Phylum ECHINODERMATA		
Class ASTEROIDEA	Asterina regularis	A,C,F
	Coscinasterias calamaria	B,C,F,H
	Stichaster australis	H
Class OPHIUROIDEA	Amphipholis squamata	F,H
Phylum CHORDATA		
Class ASCIDIACEA	Botrylloides leachi	F
	Cnemidocarpa bicornuata	A,B,F
	Corella eumyota	A,B,C
	Didemnum candidum	K
	Microcosmus kura	A,F,G
	Pyura pachydermatina	E,F
	Styela plicata	C,F,G
Class PISCES	Rhombosolea sp.	J*,K*
	Tripterygion varium	D
	Uranoscopus sp.	K*